The Effect of Benefits, Premiums, and Health Risk on Health Plan Choice in the Medicare Program

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Objective. To estimate the effect of Medicare+Choice (M+C) plan premiums and benefits and individual beneficiary characteristics on the probability of enrollment in a Medicare+Choice plan.

Data Source. Individual data from the Medicare Current Beneficiary Survey were combined with plan-level data from Medicare Compare.

Study Design. Health plan choices, including the Medicare+Choice/Fee-for-Service decision and the choice of plan within the M+C sector, were modeled using limited information maximum likelihood nested logit.

Principal Findings. Premiums have a significant effect on plan selection, with an estimated out-of-pocket premium elasticity of -0.134 and an insurer-perspective elasticity of -4.57. Beneficiaries are responsive to plan characteristics, with prescription drug benefits having the largest marginal effect. Sicker beneficiaries were more likely to choose plans with drug benefits and diabetics were more likely to pick plans with vision coverage.

Conclusions. Plan characteristics significantly impact beneficiaries' decisions to enroll in Medicare M+C plans and individuals sort themselves systematically into plans based on individual characteristics.

Key Words. Medicare, health plan choice, Medicare+Choice, managed care, adverse selection

Under the current structure of the Medicare program, payments to Medicare+Choice (M+C) managed care plans are determined by a complex administrative formula that takes data on historical Medicare fee-for-service (FFS) costs and inflates it at an annual rate determined by Congress. When M+C plans enter low-payment counties, they typically offer limited benefit packages and charge premiums. Conversely, in high-payment counties, plans offer generous benefit packages—including prescription drug benefits—and often charge no out-of-pocket premiums. As a result, the Medicare program, which is financed by nationally uniform tax rates, provides a decidedly uneven benefit package that varies by health plan and county of residence (McBride 1998).

Geographic disparities in benefits and concerns about rising costs have generated interest in alternative approaches to paying health plans in the Medicare program. The difficulty in improving the current administrative pricing mechanism is that the government does not directly observe M+C plan costs, making the determination of an appropriate payment level by the Centers for Medicare and Medicaid Services (CMS) difficult. M+C plans are required to report an estimate of their profits to Medicare. If profits are above the plan's profit rate on commercial business, the plan must offer additional benefits to dissipate the extra earnings. Because these benefits are offered only to satisfy the statutory requirement, the marginal cost of the benefits to the plan can be greater than the marginal value of the benefits to beneficiaries. Therefore, some of the extra benefits offered may be economically inefficient.

One alternative that has been proposed is to replace the current M+C payment mechanism with a system whereby plan payments would be determined by bids submitted by M+C plans, thereby providing beneficiaries a financial incentive to pick the low-bid plans (Dowd, Feldman, and Christianson 1996). This "competitive pricing" alternative relies on competition to determine government payments, out-of-pocket premiums, and optional benefits. But this approach has two potential problems. First, if Medicare beneficiaries are unresponsive to differences in out-of-pocket premiums, plans will lack a strong incentive to submit low bids. Second, under Medicare's community rating requirement for out-of-pocket premiums, health plans may be reluctant to offer benefits that appeal to high-risk enrollees (Feldman and Dowd 2000; Cutler and Zeckhauser 1997).

This study examines the factors that determine beneficiaries' choices of Medicare health plans. We estimate the effect of out-of-pocket premiums and benefits on the probability of choosing a M+C plan versus FFS Medicare, as well as the choice of a specific plan within the M+C "sector." We also examine the relationship between benefits and adverse selection within the M+C sector. To our knowledge, this is the first national study of premium and benefit elasticities using Medicare health plans that uses individual level data.

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An earlier analysis by Dowd, Feldman, and Coulam (2003) analyzed price and benefit elasticities among M+C plans using aggregate market share data.

Literature Review

Previous research has demonstrated that employees' choices of health plans are sensitive to differences in out-of-pocket premiums (Scanlon, Chernew, and Lave 1997; Cutler and Reber 1998; Dowd and Feldman 1994/1995; Feldman et al. 1989). However, less is known regarding the impact of premiums on choice in the Medicare population. Buchmueller (2000) used data from the University of California retiree health benefits program to examine the effect of premiums on the probability of switching health plans and to estimate the price elasticity of demand for FFS versus managed care. Buchmueller estimated that a $10 premium increase would lead to a 0.8 percent increase in the probability of switching among managed care plans. The estimated elasticity for FFS versus managed care was -0.16.

There are only two national studies of beneficiary sensitivity to out-of-pocket premiums in the Medicare population (Feldman et al. 1993; Dowd, Feldman, and Coulam 2003); both used aggregate market share data. The price elasticity of health plan choice estimated by Feldman et al. (1993) was approximately -2. Dowd, Feldman, and Coulam (2003) examined the factors affecting choice within the M+C sector and found that a $10 increase in the out-of-pocket premium would result in a loss of four percentage points of M+C market share (e.g., from 25 to 21 percent). Dowd, Feldman, and Coulam (2003) included a large number of benefits in their plan choice equation and found that outpatient drug benefits greater than $800 per year and coverage of dental, eye glasses, and podiatry services were all associated with greater M+C market share.

Buntin (2000) examined the effect of M+C benefits on adverse selection, using a measure of selection based on expected Medicare reimbursements. She found little evidence that coverage of particular services (e.g., prescription drugs) or higher premiums induced biased selection by beneficiaries. However, healthier beneficiaries were attracted to plans with lower primary care copayments and larger networks of primary care physicians, while sicker beneficiaries were attracted by lower specialty care copayments, larger specialty care panels, and higher perceived plan quality. Feldman, Dowd, and Wrobel (2003) found that offering a prescription drug benefit was associated with adverse selection, but some benefits such as dental coverage were associated with favorable selection.

METHODS

Our study is based on the expected utility model of health plan choice. We assume that each beneficiary chooses the health plan that yields the highest expected utility. An individual's utility from a given plan is determined by a combination of plan characteristics and interactions between individual and plan characteristics, as given by the following equation:

$$U_{ij} = x_j\beta_1 + (x_j^* s_i)\beta_2 + \varepsilon_{ij}$$

where U_{ij} represents the utility associated with plan j for individual i, x_j is a vector of plan characteristics, s_i is a vector of individual characteristics, β_1 and β_2 are vectors of coefficients, and ε_{ij} is random error. Individual characteristics enter this model only as interactions with plan characteristics because the main effect of individual characteristics is differenced away.

The standard method to estimate models of this type is McFadden's (1974) conditional logit method, which assumes that n individuals each make a single choice among j alternatives. The number of alternatives in this study is equal to the number of M+C plans available in the individual's county plus the FFS option. The number of alternatives is thus the same for all individuals in a given county, but varies across counties.

McFadden's method assumes that the error terms in the model are independent and homoskedastic. Because a Hausman test (Greene 2000, p. 865) rejected this assumption in our data, a nested logit model was employed instead. Nested logit splits the M+C sector into a separate "branch" from the FFS sector and estimates an interbranch choice model for the choice of M+C versus FFS sectors plus a within M+C choice of a particular M+C plan.

Formally, the probability of joining a particular plan j in sector k is:

$$P(j,k) = P(j|k)^* P(k) = \frac{e^{\beta_1' x_j + \beta_2'(x_j^* s_i)}}{\sum_{j|k} e^{\beta x_j}} * \frac{e^{\alpha y_k + \tau_k I_k}}{\sum_k e^{a y_k + \tau_k I_k}}$$

where x_i again represents plan attributes and $x_i^* s_i$ the plan–individual interactions that influence choice within sector, and y_i represents individual and market characteristics that influence choice of sector. There are K nests and J choices within the nest. We assume that individuals first choose between the two sectors and then, if they choose the M+C sector, choose one of the M+C plans available in their county. The "inclusive value" is I_k and is equal to:

$$I_k = \ln \sum_{k=1}^{K} e^{\beta x_{j|k}}$$

An estimated coefficient is τ_k on the inclusive value, I_k. The inclusive value represents the expected utility of the M+C nest for a particular individual and is typically calculated for each of the K nests. This analysis presents two problems that deviate from the standard nested logit framework. First, the FFS sector is a degenerative branch (i.e., there is no within-nest choice). Although individuals in the FFS sector have the option to purchase supplemental insurance, the data used in this study do not provide information on the individual's choice set of supplemental insurance options. The degenerative FFS branch prevents estimation of the within-nest β for FFS and requires τ^{FFS} be fixed equal to one (Hunt 2000). Second, because there is no variation in plan attributes in the FFS sector (FFS Medicare benefits are uniform nationwide), the model is estimated sequentially from the bottom-up using Limited Information Maximum Likelihood (LIML). LIML estimation is consistent, although not asymptotically efficient.

Empirical Model

Empirically, it is necessary to predict both the within-nest choice of M+C plans and the choice of nest. The variables for the within-nest choice equation are the beneficiary's out-of-pocket premium, benefits offered by M+C plans beyond the statutory requirement, and interactions of benefits with individual characteristics (precise variable definitions are described below). The model also includes person-specific characteristics that affect the individual's utility in a given plan, interacted with plan characteristics. Individual characteristics do not enter the model directly. Instead, it is hypothesized that certain plan characteristics may provide greater utility for some individuals than others.

The first interaction is a count of four chronic illnesses (diabetes, arthritis, angina pectoris [CHD], and hypertension) interacted with a prescription drug indicator variable. This interaction indicates whether individuals with these chronic illnesses systematically select plans with prescription drug benefits. The four chronic illnesses were selected by using the 1997 Medicare Current Beneficiary Survey (MCBS) Cost and Use file (which contains data on out-of-pocket spending) and regressing out-of-pocket spending on prescription drugs in the FFS sector on indicators for 18 chronic illnesses. These four chronic

illnesses had the largest marginal effects on out-of-pocket drug spending. Other variables might have a large impact on choice, but we were concerned about the subset of those variables that affect expenditures, as well.

A variable indicating that the individual completed a college education is interacted with prescription drug coverage to measure whether individuals with more education select plans with prescription drug benefits, controlling for the premium. Given that drug coverage in zero premium M+C plans may be underpriced relative to its actuarial value, drug coverage should be economically efficient for almost everyone and more-educated beneficiaries may be more likely to understand this. A diabetes indicator variable is interacted with a measure of the plan's vision benefits, because we expect that diabetics are more interested in vision services (diabetes is the leading cause of blindness in the United States). Finally, premium is interacted with income to measure whether higher income individuals have less-elastic demand for health plans.

The variables for the choice of M+C or FFS sector are individual characteristics (age, health status, income, and marital status), the cost of Medigap coverage, and the county M+C payment rate. The previously cited studies have found that younger, healthier, and lower-income beneficiaries are more likely to join managed care plans. Health status is measured by self-rated health (1 = excellent, 5 = poor) and the number of chronic illnesses.[1] Income is represented by an indicator variable equal to one if the individual's income is more than $20,000.[2] Marital status might affect plan choice through coordination of choice by spouses or through the availability of income substitutes for professional care. Medigap premiums are measured at the county level, and individuals who live in counties with higher Medigap premiums are expected to be more likely to join an M+C plan. (Medigap plans are an economic substitute for the additional benefits offered by M+C plans.) The government payment rate to M+C plans in the county is included as a proxy for additional benefits that are not captured in our model. Higher payment rates are expected to be positively associated with joining a M+C plan.

DATA

The main data source is the 1998 Medicare Current Beneficiary Survey (MCBS). The MCBS is a rolling cohort survey of Medicare beneficiaries. The CMS has made available a public use data file linking the survey and Medicare administrative bill records. The sample is representative of all age groups in all

50 states, the District of Columbia, and Puerto Rico. Details of the survey are available in Adler and Phil (1994). This analysis utilized data on health care expenditures and plan choices from the Access to Care portion of the survey, as well as data on health status from the personal interview portion of the survey.

The 1998 MCBS Cost and Use dataset contained 21,020 observations. Several groups were excluded in order to restrict the analysis to those beneficiaries for whom we could characterize the plan choice set and who were likely to consider a M+C plan. Individuals were excluded if someone else paid for their additional coverage beyond the basic Medicare benefits. These included currently employed individuals and those who had a supplemental policy from their former employer ($n = 5{,}038$) or were eligible for Medicaid ($n = 5{,}566$).[3] The disabled population under age 65 was excluded ($n = 3{,}202$).[4] The included sample is quite similar to the excluded aged population, with a mean age of 75.6 (versus 75.5 for the excluded sample), 58.7 percent female (versus 61.1 percent), and 21.1 percent with fair or poor self-rated health (versus 25.9 percent).

Individual data from the MCBS were matched to the Medicare Compare dataset, which provided information on benefit packages offered by 319 Medicare M+C plans that operated in 1998. Plan benefit data included information on emergency/urgent care, cost sharing for outpatient and inpatient care, and prescription drug benefits, as well as terms of coverage for mental health, preventative services, hearing services, dental care, and vision care.

In the MCBS, individuals were asked about M+C enrollment for each month during 1998. Individuals who reported being in a Medicare M+C plan during January 1998 were characterized as having chosen an M+C plan; individuals who reported not being in an M+C plan on that date were characterized as having chosen the FFS sector. For individuals who enrolled in an M+C, the "plan number" reported by the MCBS was matched to plans that reported operating in the individual's county. A successful match was achieved for all but 269 of the 3,824 M+C enrollees (a 93 percent match rate). Nineteen of the failed matches were enrolled in Medicare cost-reimbursed plans; the other 249 were enrolled in risk plans that were not listed as operating in the individual's county of residence. Because the choice set for these individuals was not properly characterized, they were excluded from the analysis. One observation had to be excluded due to missing individual data. This left a sample of 7,062, including 3,555 M+C enrollees and 3,507 FFS enrollees.

One limitation in the Medicare Compare data is that 39 percent of plans offer multiple options. For example, a plan might offer an option with a zero premium and limited drug benefits and an option that includes a better drug benefit but also charges a higher premium. The MCBS plan codes link to the plan, but not to the particular option within the plan. When a plan included multiple options, the benefits and premium associated with the lowest premium option were used. To control for possible omitted variable bias, an indicator for plans that offer multiple options is included in the model.[5]

Finally, Medigap premiums were drawn from an Abt Associates survey of the largest Medigap providers in the nation. The survey collected premium data for five Medigap insurers nationally; together, these five insurers issue more than 50 percent of the combined group and individual Medigap policies in 1996. We assume that Medigap premiums in 1998 were generally proportionate to the premiums in 1996.

Frequencies and means for plan benefits are presented in Table 1 (along with the benefits' expected relationships to the probability of choice). These descriptive statistics represent sample means and frequencies of plans in the analysis sample, which are not equivalent to unweighted means and frequencies among all plans. Because large plans operate in many counties, these plans will be an option for a larger proportion of the sample than smaller plans, so their benefit options will receive a greater weight. The means and frequencies therefore show the proportion of plans presented to the sample with the given plan attribute. The results are weighted using the MCBS sample weights.

RESULTS

Two different models are presented in this section. First, results from a nested logit model that includes only plan characteristics are presented. Second, results are presented that include both plan characteristics and interactions between individual and plan characteristics.

Premium elasticities are estimated both from the beneficiary's perspective (representing a change in out-of-pocket premium) and the insurer perspective (representing a change in out-of-pocket premium plus the plan payment). The premium elasticity is given by:

$$\varepsilon_{jk} = \beta^{premium} * premium_j * [(1 - p_{j|k}) + \tau(1 - p_k)p_{j|k}]$$

Table 1: Medicare M+C Plan Characteristics

Variable	*Definition*	*Percent of Plans / Mean*	*Standard Deviation*	*Expected Sign*
Premium	Out-of-pocket premium (dollar)	$10.17	20.724	Negative
Drug benefit	Any drug benefit with a limit over $300?	54.9%	—	Positive
Drug copayment	Dollar copayment for generic prescription drugs	$3.45	7.068	Negative
Staff model	Is the M+C plan a Staff Model HMO?	10.7%		?
Group model	Is the M+C plan a Group Model HMO?	19.6%	—	?
Primary care copayment	Dollar copayment for primary care	$6.11	4.007	Negative
For-profit	HMO for profit?	81.8%	—	?
Dental benefits	Does the plan offer any dental coverage?	63.8%	—	Positive
Vision benefits	Does the plan offer any vision coverage?	69.6%		Positive
Mental health copayment	Dollar copayment for outpatient mental health care	$12.71	9.675	Negative
Hearing benefits	Does the plan offer any hearing coverage?	58.5%	—	Positive
Ambulance copayment	Dollar copayment for ambulance services	$6.01		Negative
Emergency room copayment	Dollar copayment for emergency room	$33.81	—	Negative
Multiple plan options	Does the plan offer multiple options?	39.3%	—	Positive

The first half of the bracketed term ($\beta^{premium} * premium_j * [1 - p_{j|k}]$) represents the within-sector price elasticity (the effect of a premium change on the probability that M+C enrollees choose a particular plan) while the second half ($\beta^{premium} * premium_j * \tau[1 - p_{j|k}]$) represents the intersector price elasticity (the effect of a premium change on the probability of joining the M+C sector).

Table 2 presents the results of the nested logit model with plan characteristics only. Premium has a negative sign and is statistically significant ($p < .001$). The total out-of-pocket premium elasticity of demand is equal to -0.13. This indicates that a 10 percent increase in a M+C plan's premium is associated with a 1.3 percent decrease in the plan's enrollment. The estimated within sector out-of-pocket premium elasticity is -0.12, while the cross sector out-of-pocket premium elasticity is equal to -0.01. This indicates that most of the 1.3 percent who disenroll from the M+C plan as a result of the premium increase will choose another M+C plan, if available, other than FFS Medicare.

The insurer-perspective within-sector premium elasticity is equal to -3.87, while the cross-sector elasticity is -0.69. These larger elasticities

Table 2: Nested Logit Results

Variable	*Coefficient*	*Standard Error*	*T-statistic*	$P\|Z\| > 0$
	Within Nest Choice			
Out of pocket premium	−0.0098	0.0016	−6.214	.0000
Drug benefit	0.589	0.0841	7.010	.0000
Drug copayment	−0.080	0.0796	−6.806	.0000
Staff model	0.172	0.6322	2.720	.0065
Group model	0.007	0.0585	0.117	.9065
Primary care copayment	0.148	0.0076	19.570	.0000
For profit	−0.917	0.0622	−14.745	.0000
Dental benefits	0.018	0.0502	0.366	.7145
Vision benefits	0.023	0.0061	3.698	.0002
Mental health copayment	−0.029	0.0026	−11.139	.0000
Hearing benefits	−0.052	0.0481	−1.070	.2846
Emergency room copayment	−0.005	0.0018	−2.952	.0032
Ambulance copayment	−0.389	0.0872	4.461	.0000
Multiple plan options	0.798	0.0531	15.015	.0000
	M+ C / FFS Choice			
Age	−0.039	0.0018	−7.569	.0000
Income over $20,000	−0.562	0.0729	−7.713	.0000
Female	0.032	0.0515	0.625	.5320
Married	0.279	0.0514	5.434	.0000
Self-rated health	−0.128	0.0243	−5.520	.0000
Number of chronic illnesses	0.036	0.1518	2.394	.0166
County AAPCC	0.00003	0.0003	−0.102	.9188
County Medigap premium	0.0004	0.0001	4.630	.0000
Inclusive value parameter	0.413	0.0393	10.529	.0000

$N = 7{,}062$.

reflect the larger value of the base premium used to calculate the elasticity. If a plan increased its out-of-pocket premium by 10 percent of the total premium, its enrollment would decline by 45.6 percent.

The second way to show the effect of a premium change is to estimate the expected change in market share for a particular plan j for a given dollar change in premium:

$$(1)\ \text{Change in Market Share Plan}_{jk} = \beta^{premium} * MS_k * MS_{j|k}[(1 - MS_{j|k}) + \tau * (1 - MS_k)\, MS_{j|k}]$$

While this market-share equation is analogous to the elasticity equation given above, it has a decided advantage over the elasticity because it is not dependent on a particular premium value. The first half of (1) represents the

within sector change in market share ($\beta^{premium} * MS_{j|k} * [1 - MS_{j|k}]$), multiplied by the proportion of the sample in the M+C sector (MS_k). The second half ($\beta^{premium} * MS_k * MS_{j|k} * \tau^*[1 - MS_k] * MS_{j|k}$) represents the intersector change in market share. The probability that an individual picks the M+C sector (MS_k) is 0.308. The conditional probability of picking a particular plan within the M+C sector ($MS_{j|k}$) is equal to 0.252.[6]

The change in the j^{th} plan's unconditional market share (including the FFS sector) for a \$1 change in the j^{th} plan's premium is -0.00062. This suggests that a \$10 premium increase leads to a 0.62 percentage point decrease in the plan's market share. The typical M+C plan in this model has an unconditional market share (i.e., including FFS) of 7.76 percent, which suggests that if the typical plan raised its premium \$10, its market share would drop from 7.76 percent to 7.14 percent. That loss represents the bulk of the lost market share would be to other M+C plans if they are available, with very few beneficiaries switching to FFS as a result of the premium increase.

The presence a drug benefit is associated with an increased probability of joining a particular M+C plan ($\beta = 0.589$, $p < .001$). Similarly, the probability of joining is negatively correlated with higher copayments for generic prescription drugs ($\beta = -.080$, $p < .001$).

Individuals are more likely to join a staff model plan, relative to the reference group (IPA model), while individuals were not more likely to join group model plans. For-profit status of the M+C plan is strongly ($t = 14.75$) and negatively ($\beta = -.917$) associated with enrollment. Overall, beneficiaries prefer nonprofit staff model plans, although the large coefficient on the nonprofit variable suggests that it may be correlated with omitted variables, such as the brand name advantage enjoyed by plans such as Blue Cross/Blue Shield or Kaiser.

Among other plan characteristics, vision coverage, multiple benefit options, and having copayments for primary care, emergency room services, mental health coverage, and ambulance services are all significantly associated with membership, while charging a copayment for hearing benefits and dental coverage are not. Although the coefficients for vision coverage, emergency room copayments, ambulance services, and mental health coverage have the expected signs, the coefficient for primary care copayment does not. This may be due to omitted plan characteristics associated with higher primary care copayments, or plans with superior provider networks that may have higher primary care copayments. The positive coefficient for multiple benefit packages indicates that more popular plans offer multiple benefit packages more often.

Table 3: Marginal Probabilities and Elasticities

	Elasticity / Probability		
Variable	*Within M+C*	*M+C / FFS*	*Total*
	Within Nest Choice		
Out-of-pocket premium	−0.124	−0.010	−0.134
Total premium	−3.874	−0.691	−4.565
Drug benefit	0.437	0.035	0.472
Vision benefit	0.017	0.001	0.018
Any mental health copayment	−0.021	−0.002	−0.023
	M+C / FFS Choice		
County Medigap premium	—	0.209	0.209
Age	—	−0.531	−0.531
Self-rated health	—	−0.167	0.167
Income over $20,000	—	−0.280	−0.280
Number of chronic illnesses	—	0.543	0.543
Married?	—	0.139	0.139

In the model predicting sector choice, M+C enrollees are younger ($\beta = -.039$, $p < .001$), and healthier as measured by self-rated health. Interestingly, M+C joiners were more likely to have a chronic illness. Demographically, M+C members were more likely to be married ($\beta = .279$, $p < .001$) and less likely to have income over $20,000 ($\beta = -.562$, $p < .001$). County average Medigap premiums are positively correlated with the probability of joining a M+C plan, reflecting the substitution between M+C plans and Medigap, with a Medigap premium elasticity of 0.209.

To better understand the magnitude of the effects reported in Table 2, the coefficients for key significant variables were transformed to marginal probabilities (Table 3). The most important plan characteristic is the drug benefit. Offering a drug benefit increases the probability of selecting a particular M+C plan by 43.7 percent and the probability of selecting the M+C sector by 3.5 percent. In contrast, the total effects of vision coverage (1.8 percent) and mental health copayment (2.2 percent) are much less important.

Table 4 presents the results of the nested logit model including both plan characteristics and interactions of individual and plan characteristics. The interaction of high income and premium was significant and positive, indicating that the premium elasticity for M+C plans decreases as income increases. College education, interacted with the plan offering a drug benefit, was significant ($p = .025$) and positive, indicating that the attractiveness of drug coverage increases with education.

Table 4: Nested Logit Coefficients Including Individual Interactions

Variable	*Coefficient*	*Standard Error*	*T-statistic*	$P\|Z\| > 0$
	Within Nest Choice			
Out-of-pocket premium	−0.0106	0.0017	−6.1440	0.0000
Any drug benefit	0.2435	0.0898	2.7110	0.0067
Drug copayment	−0.0632	0.0120	−5.2620	0.0000
For profit	−0.8676	0.0617	−14.0660	0.0000
Staff model	0.1526	0.0641	2.3820	0.0172
Group model	−0.1007	0.0566	−1.7780	0.0754
Primary care copayment	0.1507	0.0077	19.4430	0.0000
Dental benefit	0.0114	0.0515	0.2210	0.8250
Vision benefit	0.2549	0.0676	3.7720	0.0002
Mental health copayment	−0.0268	0.0025	−10.6380	0.0000
Ambulance copayment	−0.0038	0.0022	−1.7530	0.0796
Hearing coverage	−0.0779	0.0483	−1.6130	0.1068
Emergency room copayment	−0.0078	0.0020	−3.9620	0.0001
Multiple plan options	0.7599	0.0526	14.4490	0.0000
Income over \$20,000 * premium	0.0095	0.0036	2.6180	0.0088
College education * drug benefit	0.3642	0.1126	3.2330	0.0012
Diabetes, hypertension, arthritis and coronary heart disease * drug benefit	0.1029	0.0476	2.1620	0.0306
Diabetes * vision benefit	0.0219	0.0128	1.7190	0.0856
	M+C / FFS Choice			
Age	−0.0137	0.0020	−6.8280	0.0000
Income over \$20,000	−0.6723	0.0741	−9.0740	0.0000
Female	0.0324	0.0516	0.6280	0.5298
Married	0.2770	0.0520	5.3280	0.0000
Self-rated health	−0.1210	0.0244	−4.9670	0.0000
Number of chronic illnesses	0.0175	0.0153	1.1450	0.2522
County AAPCC	−0.0001	0.0003	−0.3000	0.7645
County Medigap premium	0.0004	0.0001	4.5660	0.0000
Inclusive value parameter	0.4526	0.0407	11.1160	0.0000

$N = 7{,}062$.

Our two interactive markers of selection indicated that drug and vision benefits were attractive to high-cost beneficiaries. First, the coefficient on the interaction between chronic illness and drug benefits is positive, indicating that beneficiaries with these chronic illnesses are more likely to choose plans with drug benefits ($\beta = 0.102$, $p = 0.03$). Second, we found that diabetics were more likely to join plans that offer vision benefits ($\beta = 0.021$, $p = 0.08$).

Table 4 also includes plan characteristics, for which the results are generally similar to Table 2, and individual characteristics. The coefficient of

self-rated health is negative, indicating favorable M+C sector selection. However, the coefficient of chronic illness is not a significant predictor of M+C sector choice in the interactive model.

DISCUSSION

Proponents of replacing the current M+C payment mechanism with a system based on competitive pricing assume that market forces will discipline M+C plans into bidding an efficient price. This study has found that Medicare M+C premiums are significantly associated with the probability of enrollment. The estimated out-of-pocket premium elasticity of demand from the consumer's perspective is low (-0.134) but similar to those reported in other studies. The same elasticity from the insurer's perspective (-4.57) is much larger. Alternatively, looking at the effect of premiums on changes in market share, we found that a typical plan would lose .62 percentage points of their market share with a $10 increase in premium.

Is the loss of .62 percentage points of a plan's market share enough to dissuade a plan from increasing the premium by $10? That question is beyond the scope of this analysis, but the insurer perspective elasticity shows that total revenue will decline if a plan raises its premium. Although the impact of an increase in out-of-pocket premiums on profits cannot be estimated directly, it is not unreasonable to speculate that they may decline as well, providing an incentive for plans to bid competitively. However, the elasticity is not likely large enough to drive a slightly higher-priced plan from the market, as some health plans claimed during the attempts to demonstrate competitive pricing (Dowd, Coulam, and Feldman 2000).

The price elasticities are estimated over a fairly small range of premiums (the mean premium is $10.17, with nearly 80 percent of plans charging a premium less than $20, and nearly two-thirds of the selected plans not charging a premium). Overall, 33.5 percent of the sample was in counties where no M+C plan charged a premium. Therefore, the results of this study accurately reflect the responsiveness of M+C enrollees to the current incentive structure, although they may not accurately predict responses to larger premium variation. Similarly, the supplemental plan benefits observed in the data are those that the plans have chosen to offer. As such, the results of this study cannot be generalized to benefit packages substantively different from those observed.

Controlling for Medigap premiums, we found that lower-income beneficiaries are more likely than those with higher incomes to join the

M+C sector. As Medigap premiums have increased, the M+C sector has become a refuge for Medicare beneficiaries whose income is too high for Medicaid but too low to afford a Medigap plan. Plan withdrawals from the M+C sector are therefore likely to have a disproportionate impact on lower income Medicare beneficiaries.

Beneficiaries prefer plans with better benefits, controlling for premiums. The benefit with the largest marginal effect on enrollment is prescription drug coverage. A plan dropping a typical prescription drug benefit would lose market share equivalent to a $62 increase in monthly premium. This large effect suggests that the addition of a prescription drug benefit to the FFS sector may significantly decrease M+C enrollment.

We found there is favorable selection into the M+C sector based on self-rated health, but unfavorable selection based on the number of chronic illnesses (in the model without interactions). Unfavorable selection into the M+C sector may be motivated in part by a desire for prescription drug coverage. Adding a prescription drug benefit to the FFS sector may therefore increase FFS costs more than expected by diverting high cost beneficiaries with chronic illnesses away from the M+C sector.

The second question investigated by this study was whether particular M+C plan benefits encourage enrollment by higher-cost beneficiaries. Several interactions between individual and plan characteristics were significant, suggesting that individuals sort themselves systematically into plans based on individual characteristics. The significant interaction between income and premium suggests that the price elasticity of demand for health plans is smaller for higher income individuals. In fact, the premium elasticity is insignificantly different from zero for higher income individuals. This finding—that poorer individuals are more concerned about $10 monthly premium differences than higher income individuals—is not surprising, but it shows that competition may lead to segmentation of the M+C population based on income.

The finding that individuals with a college education are more likely to select a plan with a drug benefit suggests that they are better able to determine the value of this benefit in a heavily subsidized environment. Alternatively, more-educated Medicare beneficiaries may have greater demand for prescription drug coverage. Similar to the premium results, this finding suggests that competition over drug benefits may lead to segmentation based on education.

Finally, the significant interactions between chronic illness and a prescription drug benefit and between diabetes and vision care indicate that

M+C plans that offer these benefits will enroll less-healthy beneficiaries as a result. In 1998, M+C plans in high-payment areas were sufficiently overcompensated to the point that they were willing to accept some adverse selection resulting from a generous benefit structure. If payment reform brings plan payments more into line with costs, plans may begin to drop benefits that attract high-cost beneficiaries.

One potential solution to this problem would be to establish a uniform benefit structure for M+C plans. However, a uniform benefit structure could stifle innovation by plans. Also, requiring a single benefit structure for all beneficiaries would be optimal only if Medicare beneficiaries had uniform preferences, which is unlikely. A second option would be to create multiple "packages" of benefits that could be offered together, as was done with Medigap plans (Atherly 2001). However, although the model plan structure has improved consumers' ability to select a Medigap plan (Rice, Graham, and Fox 1997), it appears that adverse selection has effectively eliminated options with a prescription drug benefit. This suggests that the "package" approach may limit innovation and choices while not preventing desirable benefits from being driven from the market through adverse selection.

A third option is to risk adjust plans' bids. The CMS has explored and implemented a number of different risk adjustment systems over the years. Under a competitive-pricing system with satisfactory risk adjustment, plans considering offering a benefit would compare only the marginal cost of the benefit to the marginal beneficiary's willingness to pay. The impact of benefits on risk selection could be ignored because the costs associated with selection rate.

Since these data were collected and analyzed, the M+C program has been in decline as plans have reduced service areas, increased premiums, and reduced benefits. Not surprisingly, enrollment in the program has fallen from 6.2 million in 1999 to less than 5 million in 2002. A key benefit reduction by M+C plans has been prescription drug coverage. Between 1999 and 2002, the percentage of basic benefit packages with drug benefit caps of $500 or less rose from 23 percent to 69 percent, drug copayments increased, and coverage for brand name drugs was reduced (Achman and Gold 2002). As government payments to health plans have declined, it is likely plans are becoming more concerned about the type of adverse selection we found. Although reductions in prescription drug coverage decrease M+C plan expenditures through the creation of a healthier risk pool, this is not necessarily a desirable goal for the program. Unless government payments are tied to the benefits offered by plans or a more effective risk-adjustment mechanism is used to compensate

plans that attract higher-risk enrollees with richer benefit packages, M+C plans are likely to continue to reduce the benefits favored by high-cost Medicare beneficiaries.

NOTES

1. The chronic illness include diabetes, heart disease, hypertension, myocardial infarction, stroke, skin cancer, other cancer, and arthritis.
2. An income figure of $20,000 was chosen because it is approximately the midpoint of the distribution.
3. Medicaid eligibility was not directly observed, but it was proxied by eliminating those with incomes under $10,000.
4. One-hundred-eighteen individuals were in more than one of these categories.
5. CMS recently has completed the first analysis of enrollment in the individual products marketed by M+C plans and provided us with the following results. Among all M+C enrollees who have outpatient prescription drug coverage in January 2002, 87 percent obtained coverage through their plan's basic benefit package (the one we use for analysis) not through an optional supplementary package sold by the same plan. Among M+C enrollees who do not have outpatient prescription drug coverage, 73 percent were not offered any prescription drug coverage by their plan, whereas only 27 percent were offered a drug option and turned it down. Thus, for drug coverage, which is probably the most important benefit not covered by traditional Medicare, optional products do not appear to play a very important role in determining who has drug coverage and who does not.
6. Because we have excluded some types of Medicare beneficiaries (e.g., those with employer-sponsored supplemental insurance), these probabilities are not generalizable to the Medicare population as a whole.

REFERENCES

Achman, L., and M. Gold. 2002. *Trends in Medicare+ Choice Benefits and Premiums, 1999–2002.* Report no. 580. New York: Commonwealth Fund.

Adler, G., and M. Phil. 1994. "A Profile of the Medicare Current Beneficary Survey." *Health Care Financing Review* 15 (4): 153–63.

Atherly, A. 2001. "Medicare Supplemental Insurance: Medicare's Accidental Stepchild." *Medical Care Research and Review* 58 (2): 131–61.

Buchmueller, T. 2000. "The Health Plan Choices of Retirees under Managed Competition." *Health Services Research* 35 (5): 949–76.

Buntin, M. 2000. "Risk Selection and Product Differentiation in Medicare HMOs." Unpublished manuscript. Santa Monica, CA: RAND.

Cutler, D., and S. Reber. 1998. "Paying for Health Insurance: The Tradeoff between Competition and Adverse Selection." *Quarterly Journal of Economics* 113 (2): 433–66.

Cutler, D. M., and R. J. Zeckhauser. 1997. *Adverse Selection in Health Insurance.* Cambridge, MA: Harvard University and the National Bureau of Economic Research.

Dowd, B., R. Coulam, and R. Feldman. 2000. "A Tale of Four Cities: Medicare Reform and Competitive Pricing." *Health Affairs* 19 (5): 9–29.

Dowd, B., and R. Feldman. 1994/1995. "Premium Elasticities of Health Plan Choice." *Inquiry* 31 (4): 438–44.

Dowd, B., R. Feldman, and J. Christianson. 1996. *Competitive Pricing for Medicare.* Washington, DC: AEI Press.

Dowd, B., R. Feldman, and R. Coulam. 2003. "The Effect of Health Plan Characteristics on Medicare+Choice Enrollment." *Health Services Research* 38 (1, part 1): 113–35.

Feldman, R., and B. Dowd. 2000. "Risk Segmentation: Goal or Problem?" *Journal of Health Economics* 19 (4): 499–512.

Feldman, R., B. Dowd, and M. Wrobel. 2003. "Risk Selection and Benefits in the Medicare+Choice Program." *Health Care Financing Review* 25 (1): 23–36.

Feldman, R., M. Finch, B. Dowd, and S. Cassou. 1989. "Demand for Employment-Based Health Insurance Plans." *Journal of Human Resources* 24 (1): 115–42.

Feldman, R., C. Wisner, B. Dowd, and J. Christianson. 1993. "An Empirical Test of Competition in the Medicare HMO Market." In *Competitive Approaches to Health Care Reform*, edited by R. Arnold, R. Rich, and W. White. Washington, DC: Urban Institute Press.

Greene, W. 2000. *Econometric Analysis*, 4th ed. Upper Saddle River, NJ: Prentice Hall.

Hunt, G. 2000. "Alternative Nested Logit Model Structures and the Special Case of Partial Degeneracy." *Journal of Regional Science* 40 (1): 89–113.

McBride, T. 1998. "Disparities in Access to Medicare Managed Care Plans and Their Benefits." *Health Affairs* 17 (6): 170–80.

McFadden, D. 1974. "Conditional Logit Analysis of Qualitative Choice Behavior." In *Frontiers in Econometrics*, edited by P. Zarembka, pp. 105–42. New York: Academic Press.

Rice, T., M. Graham, and P. Fox. 1997. "The Impact of Policy Standardization on the Medigap Market." *Inquiry* 34 (2): 106–16.

Royalty, A., and N. Solomon. "Price Elasticities in a Managed Competition Setting." *Journal of Human Resources* 34 (1): 1–41.

Scanlon, D., M. Chernew, and J. Lave. 1997. "Consumer Health Plan Choice: Current Knowledge and Future Directions." *Annual Review of Public Health* 18: 507–28.